

P4.1035 Beta-induced Alfvén eigenmodes destabilized by resonant magnetic perturbations in J-TEXT Tokamak

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See full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P4.1035.pdf>

Beta-induced Alfvén Eigenmodes (BAEs) destabilized by resonant magnetic perturbations (RMPs) are investigated in J-TEXT tokamak. Two kinds of BAEs are observed with RMPs of finite amplitude. One is considered as m-BAE, due to the strong correlation with magnetic island, frequency characteristic, mode number and driving mechanism. Specifically: 1. The exciting threshold is studied. After RMPs penetration, m-BAE could be excited when the width of the magnetic island exceeds a threshold (about 2.6 cm) and lower than an upper limit (about 4.2 cm). A similar result is also found in the experiments that a pair of m-BAE is excited along with TM. 2. In the exciting condition range, the amplitude of m-BAE decrease with enlarging magnetic island. 3. The m-BAE forms a standing wave structure. The nodes of m-BAE are located around O point and X point of the magnetic island while the BAE perturbs between the O point and X point. 4. The frequency of detected m-BAE locates in the BAE gap calculated by NOVA-K code. Another mode is identified as the magnetic island-induced AE (labeled as MIAE-like mode in this work), consistent with the prediction of theory (Biancalani A. et al 2010 Phys. Rev. Lett. 105 095002). The frequency of MIAE-like mode is approximately proportional to the square of magnetic island width. In addition, the pressure gradients may have a driving effect on MIAE-like mode. In addition, m-BAE becomes weaker and MIAE-like mode becomes stronger with growing magnetic island, so we assume that energy exchanging would take place between the magnetic island and m-BAE. The free-energy source of pressure gradients may have a driving effect on MIAE-like mode.

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